

—2° at Dayton. *West Virginia*: —17° at *Flemington and —2° at Morgantown. *Wisconsin*: —40° at *Neillsville and —30° at La Crosse. *Wyoming*: —34° at Fort Petterman and —12° at Cheyenne.

Those marked with a star (*) are reported by U. S. Army Post Surgeons or Voluntary Observers.

Ranges of Temperature at Signal Service Stations.—Monthly ranges in general varied from 40° to 80° over the country east of the Rocky Mountains. Ranges less than 50° occurred in the following districts: New England and Middle States, along the immediate coasts; throughout the South Atlantic and East Gulf States; in the West Gulf States east of a line including the stations of Galveston, Shreveport and Little Rock; throughout the Lower Lake region and the lower peninsula of Michigan; in central Tennessee; within the immediate region of the Ohio river and throughout the Middle Plateau and Pacific coast regions. The smallest ranges were: San Francisco, 19°; Key West, 23°; Portsmouth, N. C., 26; Sacramento, 29°; Olympia, 30°; Sandy Hook, 32°; Portland, Or., 33°; Smithville, Los Angeles and San Diego, 34°; Punta Rassa, 35°; Charleston, 37°; Portland, Me., Umatilla, Augusta, Savannah, Wilmington and Cape May, 38°; Detroit, Wood's Holl, Mobile, Jacksonville and Winnemucca, 39°. The largest were Uvalde, Tex., 87°; Camp Thomas, Ariz., 84°; St. Vincent, Minn., 79°; Fort Custer, Mont., and Concho and Fort Davis, Tex., 78°; Forts Keogh and Buford, 77°; Forts Gibson and Supply, Ind. T., 75°. The daily ranges varied in the different districts as follows: New England, from 19° at Thatcher's Island to 43° at Burlington; Middle States, 25° at Chincoteague, Cape May and Sandy Hook to 36° at Cape Henry; South Atlantic States, 24° at Charleston and Fort Macon to 30° at Augusta and Wilmington; East Gulf States, 14° at Key West to 32° at Montgomery; West Gulf States, 24° at New Orleans to 46° at Corsicana; Ohio valley and Tennessee, 27° at Louisville to 42° at Morgantown; Lower Lakes, 23° at Detroit to 38° at Cleveland; Upper Lakes, 30° at Alpena to 45° at Milwaukee; Upper Mississippi valley, 35° at St. Paul to 46° at Davenport and Keokuk; Red River of the North valley, 34° at Moorhead to 35° at St. Vincent; Missouri valley, 29° at Omaha to 42° at Leavenworth; Texas, 34° at Brownsville to 53° at Castroville and Uvalde; Eastern Rocky Mountain slope, 36° at Fort Sill to 51° at Deadwood; Rocky Mountains, 30° at Eagle Rock to 47° at Cheyenne; Middle Plateau, 25° at Piche and Salt Lake City to 30° at Winnemucca; Southern Plateau, 34° at Yuma to 48° at Florence, Tucson and El Paso; Pacific coast regions, 14° at San Francisco and 17° at Portland, Or., to 45° at Camp.

Frost—Was reported as almost of daily occurrence from all stations north of the 35th parallel. Southward of that line, in the various States, on the following dates: South Carolina, 12th, 13th, 26th to 30th; Georgia, 2d, 3d, 7th, 12th, 13th, 15th, 16th, 22d, 23d, 25th to 29th; Florida, western portion, 1st, 2d, 3d, 12th, 24th to 29th; eastern portion, north of Punta Rassa, 26th, 28th; Alabama, 2d, 7th, 12th, 13th, 15th, 25th to 29th; Mississippi, 1st, 2d, 7th, 9th, 11th, 12th, 15th, 22d, 23d to 26th, 29th; Louisiana, 1st, 2d, 8th, 11th, 12th, 24th to 26th; New Orleans, 31st, it is estimated that one-half of the orange crop has been destroyed by freezing, and a large number of the young trees killed, cotton and sugar crops have also suffered to a great extent; Texas, 1st to 29th; southern New Mexico, 7th, 8th, 9th, 18th, 19th, 30th, 31st; southern Arizona, 1st, 4th, 5th, 6th, 7th, 17th, 18th; southern California, 3d, 7th, 9th, 10th, 12th, 18th, 27th, 28th.

Ice.—Its formation in the northern sections of the country is fully considered under the head of "*Ice in Rivers and Harbors*." To the southward of the 33d parallel it formed of slight thickness in the various States on the following dates: Georgia, 1st, 2d, 3d; northwestern Florida, 23d, 24th, 25th; Alabama, 1st, 9th, 12th; Mississippi, 9th, 10th, 11th, 22d to 26th; Louisiana, 1st, 2d; Texas, 1st to 20th, 22d to 31st; Arizona, 1st, 5th, 7th to 11th, 23d, 24th.

PRECIPITATION.

The distribution of rain-fall for January, 1881, is shown on chart No. III, as determined from the regular Signal Service stations and about 450 reports of army post surgeons and voluntary observers. The table on the chart shows the average precipitation for each district, as compared with that of the present month. An excess of rain or snow-fall has occurred in the districts on the Atlantic and East Gulf coasts, varying from 3.80 inches in Florida to 0.83 inches in New England. In the Middle and North Pacific coast region the excess has ranged from 2.61 to 2.16, while the greatest deficiency is reported from the South Pacific coast region, where it amounts to 1.26 in. In Missouri, Tennessee and the Ohio valley and the Lower Lake region, the amount of rain and snow-fall has been from one-half to one inch less than the average for the month, and in all other districts not previously named there has been a slight excess, except, possibly, the region lying south of the Platte river and north of Texas. In this region the stations are so limited in number that it is not possible to give full and accurate information, but the indications are that the rain-fall has been very slight in this region.

Special Heavy Rains.—3rd, Ft. Barracas, Fla., 4.75 inches. 3rd and 4th, Pensacola, 3.76; Vicksburg, 3.66; Fayette, Miss., 2.70. 5th and 6th, White Plains, N. Y., 3.20. 8th, Jacksonville, 3.08. 8th and 9th, Cedar Keys, 4.97; St. Augustine, Fla., 3.93. 9th and 10th, Freehold, N. J., 4.06; Fall River, Mass., 4.60; White Plains, N. Y., 3.00; Barnegat, 3.87;

Atlantic City, 3.12. 10th, Newport, R. I., 3.08; Boston, 2.86; New London, 4.01. 10th and 11th, Lawrence, Mass., 4.40; Eola, Or., 3.12; Ft. Stevens, Or., 5.15. 13th and 14th, Ft. Bidwell, Cal., 7.00. 14th, Forsyth, Ga., 2.15. 16th, Ft. Gaston, Cal., since 11 a. m. of the 11th, 14.49 steady rain, wind SSE. 17th and 18th, Ft. Stevens, Or., 3.15. 15th and 19th, Elsworth, N. C., 2.00; Vicksburg, 5.78; Atlanta, 4.18. 19th and 20th, Forsyth, Ga., 3.86; Elsworth, N. C., 2.75; Augusta, 4.18; Aiken, S. C., 4.05. 20th and 21st, Woodstock College, Md., 2.20. 21st and 22nd, White Plains, N. Y., 4.00. 24th, Jacksonville, 2.18. 27th and 29th, Fort Ringgold, Texas, 3.22. 28th and 29th, Presidio, San Francisco, Cal., 3.60; Alcatraz Island, Cal., 5.82. 29th, San Francisco, 4.67. 29th and 30th, Sacramento, 4.01; Fort San Jose, Cal., 3.64; Benecia Barracks, Cal., 3.92; Angel Island, Cal., 6.68; Oakland, Cal., 8.35. 31st, Fort Stevens, Or., 2.75.

Largest Monthly Rain-falls.—Emigrant Gap, Cal., 22.19 inches; Alta, Cal., 21.00; Camp Gaston, Cal., 20.78; Cisco, Cal., 16.11; Colfax, Cal., 15.59; Calistoga, Cal., 15.58; Ft. Stevens, Or., 14.63; Napa, Cal., 11.69; Roseburg, 11.60; New Orleans, 11.15; White Plains, N. Y., 10.50; Oakland, Cal., 10.48; Ft. Bidwell, Cal., 10.00; Ft. Canby, Wash. Ty., 9.84; Auburn, Cal., 9.61; Red Bluff, 9.40; Angel Island, Cal., 9.39; Santa Cruz, Cal., 9.38; Cedar Keys, Fla., 9.36; Jacksonville, 9.12; Yosemite valley, Cal., 9.10; Ft. Barrancas, Fla., 8.96; Olympia, Wash. Ty., 8.90; Neah Bay, Wash. Ty., 8.78; Alcatraz Island, Cal., 8.76; Augusta, Ga., and San Francisco, 8.69; Portland, Or., 8.57; Barnegat, 8.43; Elsworth, N. C., 8.38; Atlanta, Ga., 8.35; Petaluma, Cal., 8.13; Freehold, N. J., and Hector, N. Y., 7.85; Aiken, S. C., 7.72; Mobile, 7.62.

Smallest Monthly Rain-falls.—Mojave, Texas Hill, Maricopa, Casa Grande, Benson, Phoenix, Florence and Yuma, Ariz., and White Water and Mammoth Tank, Cal., none; Ft. Abraham Lincoln, Dak., trace; Silver City, N. M., 0.02 inch; Camp Thomas, Ariz., 0.03; La Mesilla, N. M., 0.04; Tucson and Grant, Ariz., 0.05; Wickenburg and Ft. Verde, Ariz., 0.07; Pautana, Cal., 0.08; Ft. Randall, Dak., 0.10; McCavitt, Tex., 0.12; St. Vincent, Minn., 0.13; Tecoma, Nev., Dodge City and Leavenworth 0.15; Ft. Totten, Dak., Ft. Wingate, N. M., Prescott, Ariz., North Platte and Frankford, Mo., 0.16; Ft. Wallace and Yates Center, Kan., 0.19; Uvalde, Stockton and Apache, 0.20; Concho, 0.22; Anaheim, Cal., 0.25; Halleck, Nev., and Ashley, Mo., 0.31; Ft. Supply, Ind. Ty., 0.32; El Paso and Brackettville, Tex., and Golconda, Nev., 0.35; Coleman, Tex., and Cheyenne, 0.36; Mason, Tex., 0.37; Santa Fe, 0.38; Ravenna, Cal., 0.39; Ft. Hartsuff, Neb., Ft. Davis, Tex., and Dover, Del., 0.40; Ft. Sheridan, Neb., 0.42; Graham, Tex., 0.43; Leavenworth, 0.44; Terrace, Nev., and Castroville, Tex., 0.45; Fts. Elliott and Stevenson, 0.47; Jacksboro, Tex., 0.48; Denver and St. Louis, 0.49; Keokuk, 0.50; San Diego, Cal., and Peoria Ill., 0.52; Toledo, 0.54; Socorro, N. M., 0.55; Ft. Meade, Dak., and Elko, Nev., 0.56; Newhall, Cal., and Creswell, Kan., 0.57; San Antonio, Tex., 0.58; Topeka, Kan., Moorhead, Min., and Sumner, Cal., 0.60; Lawrence, Kan., and Omaha, 0.61.

Rainy Days.—The number of days on which rain or snow has fallen varies as follows: New England, 7 to 18; Middle Atlantic States, 11 to 16; South Atlantic States, 10 to 18; Eastern Gulf States, 11 to 16; Western Gulf States, 6 to 13; Ohio valley and Tennessee, 13 to 23; Lower Lake region, 10 to 24; Upper Lake region, 10 to 20; Upper Mississippi valley, 3 to 18; Missouri valley, 8 to 17; Valley of the Red River of the North, 6 to 11; Texas, 3 to 13; Rocky Mountains, 1 to 12; Middle Plateau, 6 to 18; Southern Plateau, 0 to 3; California, 3 to 11; Oregon, 10 to 19; Washington Territory, 12 to 19.

Cloudy Days.—The number varied in New England from 3 to 16; Middle Atlantic States, 10 to 16; South Atlantic States, 13 to 20; Eastern Gulf States, 8 to 21; Western Gulf States, 9 to 16; Ohio valley and Tennessee, 14 to 22; Lower Lake region, 15 to 25; Upper Lake region, 6 to 18; Upper Mississippi valley, 9 to 17; Missouri valley, 7 to 15; Valley of the Red River of the North, 4 to 6; Texas, 2 to 21; Rocky Mountains, 1 to 21; Middle Plateau, 10 to 16; Southern Plateau, 2 to 5; California, 5 to 10; Oregon, 12 to 19.

Rain or Snow from a Cloudless Sky.—Leavenworth, 21st; Omaha, 21st, 22d; Cincinnati, 27th; Lewiston, Idaho, 28th; Burlington, Vt., 30th.

Snow—was reported in the various districts on the following days: *New England.*—3rd to 12th, 14th, 17th, 18th, 19th, 21st, 22nd, 26th to 31st. *Middle States.*—1st to 6th, 9th to 12th, 14th, 16th, 19th, 21st to 31st. *South Atlantic States*—except southern Georgia, 1st to 3rd, 24th, 25th. *East Gulf States*—except Florida, 1st, 2nd, 23rd, 24th. *West Gulf States*—including Texas, 1st to 3rd, 5th, 8th to 11th, 17th, 19th, 20th, 22nd to 24th; at New Orleans 4 inches fell on the 24th, being the greatest depth since 1852, when sleighing was indulged in; Melissa, Tex., "have had so far seven snow storms this winter, which is five more than has ever occurred in any past winter, but frequently one storm has given a greater depth than the combined storms of this season." *Tennessee.*—1st, 2nd, 4th, 5th, 6th, 9th to 14th, 21st to 26th. *Ohio valley.*—3rd to 19th, 21st to 31st. *Lower Lakes.*—3rd to 17th, 21st to 31st. *Upper Lakes.*—1st to 16th, 20th to 31st. *Upper Mississippi valley.*—4th to 9th, 13th to 16th, 20th to 31st. *Missouri valley.*—1st to 16th, 20th to 31st.

Red River of the North valley.—1st, 5th, 7th, 8th, 9th, 12th to 15th, 29th to 31st. *Rocky Mountain.*—1st to 17th, 20th to 31st. *Southern Plateau.*—2nd, 3rd, 4th, 6th, 14th, 16th, 17th, 18th, 20th, 30th. *Middle Plateau.*—1st, 4th to 11th, 13th to 16th, 25th, 26th. *Northern Plateau.*—3rd, 4th, 7th, 9th, 10th, 16, 19th, 26th. *California.*—9th, 10th, 13th, 15th, 16th, 17th, 19th, 25th, 26th. *Oregon and Washington Territory.*—2nd, 3rd, 9th to 15th, 17th, 24th to 28th, 31st.

Greatest Monthly Snow-falls.—Cisco, Cal., 173.50 inches; Summit, Cal., 45; Niles, Mich., 43; Newport, Vt., 37.25; Woodstock, Vt., 36.30; Cornish, Me., 36; Emigrant Gap, Cal., 35; Rowe and Westborough, Mass, 34; Grafton, N. H., 33; Truckee, Cal., 31.50; Troy, N. Y., 31; Lansing, Mich., 30.40; Trinidad, Col., 29; New Corydon, Ind., 28.80; Antrim, N. H., 28.50; Deer Park, Md., 26.50; Ogden, Utah, 26.25; Cooperstown, N. Y., 25; Friendship, N. Y., 23.75; Dyberry, Pa., 23.50; Little Mountain, Ohio, 22.50; Nora Springs, Iowa, 20; Wellsboro, Pa., 19.92; Ripon, Wis., 19; Patterson, N. J., 18.25; Rockford, Ill., 17.25.

Snow on Ground at End of Month.—No reports of this condition were received from any station south of the 35th parallel, but northward of that line the distribution is shown in the various States and Territories as follows: *Maine*, 7 to 24 inches. *New Hampshire*, 30 to 48. *Vermont*, 20 to 36. *Massachusetts*, 1 on the coast to 36 in the interior. *Connecticut*, 3 to 8. *New York*, 4 to 40. *New Jersey*, 6 to 12. *Pennsylvania*, 3 to 25. *Maryland*, 0.30 to 16. *Virginia*, 4 to 8. *West Virginia*, 0 to 3. *Ohio*, 1 to 9. *Indiana*, 6 to 15. *Illinois*, 1 to 16. *Michigan*, 15 to 42. *Wisconsin*, 5 to 30. *Iowa*, trace to 20. *Minnesota*, 3 to 35. *Tennessee*, trace at Memphis. *Indian Territory*, trace at Ft. Gibson. *Arkansas*, Ft. Smith, snow on ground without intermission since November 15th, 1880. *Nebraska*, 1 to 6; Austin, 31st, snow still on ground since the early part of December, a condition which has not obtained before in the past 7 years, especially in the Loup valley. *Dakota*, 3 to 9. *Colorado*, 4 to 18. *Montana*, 12 to 24.

RELATIVE HUMIDITY.

The percentage of mean relative humidity for the month ranges, as follows: New England, 64 to 75; Middle Atlantic States, 70 to 84; South Atlantic States, 71 to 85; Eastern Gulf States 73 to 81; Western Gulf States, 64 to 82; Ohio Valley and Tennessee, 69 to 80; Lower Lake region, 66 to 83; Upper Lake region, 68 to 81; Upper Mississippi valley, 71 to 77; Missouri valley, 71 to 92; Valley of the Red River of the North, 69 to 93; Texas, 52 to 77; Middle Plateau, 48 to 64; Southern Plateau, 39 to 47; California, 63 to 82; Oregon, 78 to 87. *High stations* report the following percentages not corrected for altitude: Mt. Washington, 74.2; Pike's Peak, 69.8; Denver, 58.5; Cheyenne, 58.5; Eagle Rock, 77.7; Santa Fe, 60.0.

WINDS.

The prevailing direction of the wind during the month of January, 1881, are shown by the arrows flying with the wind, on chart No. II. The prevailing direction was *northwest* to *north* on the Atlantic coast, in the Southern States and at stations on the eastern slope of the Rocky Mountains. *North* to *east* winds prevailed in California and Arizona, and *east* to *south* winds in the North Pacific coast region, and at stations in Nevada and Idaho. In the Lake region the prevailing direction was from *northwest* to *southwest*, except in the eastern portion, where they were generally from the *south*. The prevailing direction of wind at Pike's Peak and Denver, was from the *southwest* and *south*, respectively. The prevailing direction on Mount Washington was *northwest*.

Total Movements of the Air.—The following are the largest total movements at Signal Service stations: Mt. Washington, 28,705 miles; Thatcher's Island, 14,102; New Shoreham, 12,629; Cape May, 11,852; Portsmouth, N. C., 11,489; Wood's Holl, 11,267; Indianola, 11,107; Cape Hatteras, 10,876; Kittyhawk, 10,740; Delaware Breakwater, 10,631; Eastport, 10,107; Barnegat, 9,974; Cheyenne, 9,855; Chincoteague, 9,277; Sandy Hook, 9,214; Coleman, 9,077. The *smallest* are: La Mesilla, 1,794 miles; Phoenix, 1,797; Florence, 1,839; Visalia, 1,890; Roseburg, 1,973; Missoula, 1,976; Lynchburg, 2,134; Silver City, 2,500; Augusta, Ga., 2,510; Boise City, 2,790; Dubuque, 2,810; Helena, 2,876; Tuscon, 2,981; Uvalde, 2,991; Los Angeles, 3,258.

High Winds.—Winds of 50 miles and above were observed, as follows: On summit of Mt. Washington, 1st to 10th, 12th to 15th, 17th, 18th, 20th to 31st; the highest wind was 130 miles S. on the 10th and NW. on 29th. On summit of Pike's Peak, 4th, 9th to 12th, 26th to 30th, with a maximum of SW. 88 miles on the 28th. Umatilla, NE. 58 on the 26th. Cheyenne, W. 52, 11th. North Platte, N. 52, 5th, Ft. Elliott, NW. 52, 5th. Kittyhawk, N. 56, 14th. Del. Breakwater, N. 52, 14th. Cape May, NW. 56, 27th. Wood's Holl, SE. 56, 10th. Thatcher's Island, E. 66, 21st. New Shoreham, NE. 60 21st.

Local Storms.—Santa Ana valley, Cal., 21st, p. m., violent wind-storm, destroying buildings and fences, delaying trains and prostrating telegraph poles. Petersburg, Va., 19th, very heavy wind-storm; large warehouse destroyed and other property more or less damaged.